



Smart Vehicles

The problem

- Green House Gas emissions from the transport sector are steadily rising, caused by the continuing growth of transport volume. More than 90% of total transport emissions are due to road transport.
- Even efforts to adopt different kinds of fuel from petrol seem to produce contradictory results.
- Another problem is the way cars and all motor vehicles are managed and driven.

Policy Relevance

- Community Strategy for reducing CO₂ emissions from cars
- European Directive 98/70/EC
- European Directive on Bio fuels 2003/30/EC
- Green Paper Towards a new culture for Urban Mobility
- Communication on Competitive Automotive Regulatory Framework for the 21st Century, CARS21
- Regulation proposal "Setting emission performance standards passenger cars"

Best Practices

- Italian Car Guide
- Legambiente and ATA Switzerland EcoTopTen
- "Well-to-Wheels analysis" conducted by JRC-ISPRA
- The Company Group effort on reducing its fleet emissions

Data and Indicators

Links and References



The problem

Green House Gas emissions from the transport sector are steadily rising, caused by the continuing growth of transport volume. More than 90% of total transport emissions are due to road transport.

Policies and measures have so far not been effective in avoiding further growth.

In fact, in the last 20 years, efficiency improvements in passenger cars and motor vehicles have not been sufficient in counteracting this trend on climate change: from 1990 to 2007 in Europe (EU-27) the annual CO₂-equivalent emissions by cars has grown by 43.2 million tons.

The JRC – ISPRA study "Well-to-Wheels analysis of future automotive fuels and powertrains in the EU context" estimates the energy balance, GHG balance, costs and availability of all technically feasible and alternative fuels from all sources with a significant potential to replace oil-based fuels.

To date, two of the main results of this study are:

- 1) to do better in comparison with conventional vehicles, it's necessary that the public and private sectors are able to invest and pay a lot;
- 2) conventional bio fuels save GHG emissions if made on EU set-aside land, but the GHG saving per euro spent and per hectare occupied is much worse than in other sectors.

Even efforts to adopt different kinds of fuel from petrol seem to produce contradictory results.

Electrical vehicles

Their large-scale use in urban contexts will probably become a reality in the years to come; this possibility will be very helpful towards cutting air pollutants in our cities, but there is no certainty that it will help to reduce CO₂ emissions.

Bio fuels:

Mandatory bio fuel quotas have been introduced in the Bio fuels Directive (replacing 2% of vehicle fuel supply by 2005 and 5.75% by 2010). The 2005 target was not met and it seems unlikely that the 2010 target can be reached. Nevertheless, in 2007 the EU target for bio fuels was increased to an ambitious 10% level by 2020, on condition that production is sustainable and second generation technologies are commercially available.

Unfortunately, according to the EEA Scientific Committee, the 10% bio fuel target is an experiment whose unintended effects are difficult to predict and control. The EEA Scientific Committee's concerns can be summarised as follows:

- Bio fuel production based on first generation technologies does not optimally use biomass resources with regard to fossil energy saving and to greenhouse gas reduction. Technologies for direct heat and electricity generation should be preferred because they are more economically competitive and more environmentally effective than bio fuel production for vehicles.
- Biomass utilisation implies combustion of very valuable and finite resources from our living environment. These resources ought to be preserved wherever possible. Therefore biomass utilisation must necessarily go hand in hand with energy efficiency improvements. This is not yet the case for the majority of applications in the automotive and residential sectors.
- The EEA has estimated the amount of available arable land for bio energy production without harming the environment in the EU (EEA Report No 7/2006). In the view of the EEA Scientific Committee, the land required to meet the 10% target exceeds this available land area even if a considerable contribution of second generation fuels is assumed. The consequences of the intensification of bio fuel production are thus increasing pressures on soil, water and biodiversity.
- The 10% target will require large amounts of additional imports of bio fuels. The accelerated destruction of rain forests due to increasing bio fuel production can already be witnessed in some developing countries. Sustainable production outside Europe is difficult to achieve and to monitor.

Therefore, the EEA Scientific Committee recommends suspending the 10% goal, carrying out a new, comprehensive scientific study on the environmental risks and benefits of bio fuels and setting a new and more moderate long-term target, if sustainability cannot be guaranteed.



We all know that addressing the problems connected to the transport sector is necessary in changing the modal split in all Europe, balancing it to other ways of moving, especially going on foot, cycling and using trains and means of public transport. Anyway, another problem is the oversize, old age and inadequacy (especially from an environmental point of view) of European car fleets.

When it's necessary to buy a new car or rent it long term, it would be very useful to follow these simple tips when choosing:

- never choose a car that produces more than 140 CO₂ grams per km;
- express a preference for a new car with methane supply (if the methane station is not too far from home); it won't reduce energy consumption, but it will be helpful in cutting air pollution and operating expenses;
- take a thorough look at future operating expenses and fuel consumption;
- express a preference, if affordable, for a new small hybrid car (petrol and electric energy).

Another problem is the way cars and all motor vehicles are managed and driven.

Speed, first of all, is the main cause of casualties and lack of safety (more than 5,000 people die in road accidents every year in Italy), but it's also one of the most important factors in fuel consumption and car pollution: for instance, a 2005 study conducted by the University of Brescia for the Local Council of Brescia estimated that by reducing the average speed of vehicles (from 120 km/h to 100 km/h) driving on the motorway near this important Italian city, it would have been possible to cut CO emissions by 21%, SO₂ emissions by 16% and micro particles by 10%.

In general, good driving behaviour and car maintenance can cut consumption and Green House Gas emissions by 10-15%.

Policy Relevance

Community Strategy for reducing CO₂ emissions from cars: The EU Commission adopted a Community Strategy for reducing CO₂ emissions from cars in 1995. The strategy was based on three pillars: voluntary commitments from the car industry to cut emissions, improvements in consumer information and the promotion of fuel efficient cars via fiscal measures.

European Directive 98/70/EC: In 1998 the European Automobile Manufacturers Association (ACEA) adopted a commitment to reduce average emissions from new cars sold to 140g CO₂/km by 2008 and, in 1999, the Japanese Automobile Manufacturers Association (JAMA) and Korean Automobile Manufacturers Association (KAMA) adopted a commitment to reduce average emissions from new cars sold to 140g CO₂/km by 2009. These commitments were recognised by several EU Commission Recommendations in 1999 and 2000.

In 1998 the European Directive 98/70/EC, relating to fuel quality, set quantitative targets for 1 January 2000, including:

- a) the phasing out of leaded petrol;
- b) reduction of the sulphur content in petrol and diesel to a maximum of 150 and 50 mg/kg, respectively;
- c) reduction of the benzene content in petrol to a maximum of 1 %.

With this Directive an almost complete phase-out of leaded fuel has been achieved.

European Directive on Bio fuels 2003/30/EC: In order to promote the use of bio fuels in transport and pave the way for gradually increasing the capacity of bio fuel production, while securing the energy supply and rural employment, in 2003 a EU Directive (2003/30/EC) was adopted that aimed at a bio fuel penetration of 2% in 2005 and 5.75 % in 2010. Member States have not been subjected to any binding target, but their progress has to be reported annually with respect to projected goals. Member States have generally been allowed to reduce excise duties for bio fuels by up to 100% (Directive (2003/96/EC) in order to stimulate their use (Germany is an example of a country opting for full de-taxation of bio fuels).

In 2007 the EU target for bio fuels was increased to an ambitious 10% level by 2020. The Bio fuels Directive set the objective of replacing 2% of vehicle fuel supply by 2005 and 5.75% by 2010.



The 2005 target was not met and it seems unlikely that the 2010 target can be reached. Nevertheless in 2007 the EU target for bio fuels was increased to an ambitious 10% level by 2020, on condition that production was sustainable and second generation technologies were commercially available.

Green Paper Towards a new culture for Urban Mobility: The European Commission adopted the Green Paper Towards a new culture for Urban Mobility on 25. September 2007. This document addresses, for example, how the use of clean and energy efficient technologies can be increased. With the Green Paper, the Commission set a new European agenda for urban mobility, aiming to facilitate the search for solutions by, for example, sharing best practices. Moreover, this document addresses, for example, how the quality of collective transport can be improved, how the use of clean and energy efficient technologies can be increased, how walking and cycling can be promoted and how the rights of passengers on public transport can be protected.

Communication on Competitive Automotive Regulatory Framework for the 21st Century, CARS21

On 7 February 2007, the Commission adopted two parallel Communications: a Communication setting out the results of the review of the Community Strategy to reduce CO₂ emissions from passenger cars and light-commercial vehicles and a Communication on a Competitive Automotive Regulatory Framework for the 21st Century, CARS21. The Communications underlined that progress had been made towards the target of 140g CO₂/km by 2008/2009, but that the Community objective of 120g CO₂/km would not be met by 2012 in the absence of additional measures.

Setting emission performance standards for new passenger cars

The Communications proposed an integrated approach with a view to reaching the Community target of 120g CO₂/km by 2012 and announced that the Commission would propose a legislative framework to achieve the Community objective by focusing on mandatory reductions of emissions of CO₂ to reach the objective of 130g CO₂/km for the average new car fleet by means of improvements in vehicle motor technology. Consistent with the approach under the voluntary commitments adopted by the manufacturers, this covers those elements that are taken into account in the measurement of CO₂ emissions of passenger cars in accordance with Regulation (EC) No 715/2007 of the European Parliament and the Council of 20 June 2007 on type approval of motor vehicles with respect to emissions from light passenger and commercial vehicles (Euro 5 and Euro 6) and on access to vehicle repair and maintenance information. A further reduction of 10g CO₂/km, or equivalent if technically necessary, will be delivered by other technological improvements and by an increased use of bio fuels. In addition, consumer behaviour has an affect on overall emissions from passenger cars and therefore consumers should be provided with information regarding whether new passenger cars meet the emission targets set under this Regulation. The legislative framework should be compatible with the overall objective of reaching the EU's Kyoto targets and should be complemented by other more use-related instruments such as differentiating car and energy taxes.

In December 2007 the EU Commission presented a proposal for a Regulation of the European Parliament and the Council "Setting emission performance standards for new passenger cars" as part of the Community's integrated approach to reduce CO₂ emissions from light-duty vehicles.

Best Practices

Italian Car Guide

Every year the Italian Ministry of Economic Development publishes a Car Guide focused on fuel savings and CO₂ emission cutting. It also contains a list of the environmental performances of hundreds of motor vehicle models but it's not up-to-date.

Thanks to smart driving and a correct car maintenance, indeed, it's possible to cut consumption and Green House Gas emissions by 10-15%, and an improvement in road safety too. I

It is possible here to write a short list of important advice:

1. accelerate smoothly;
2. insert the higher gear as soon as possible;
3. keep a moderate and, if possible, even speed;
4. pay attention while driving; drive delicately and avoid slamming on the brakes and pointless gear changes;



5. turn off the engine when possible, for instance while waiting at a level crossing or waiting in a very long traffic jam;
6. change motor oil at the right moment;
7. keep tyres at the right pressure (low pressure makes fuel consumption increase)
8. remove ski or luggage racks immediately after their usage and carry only the necessary objects (car weight and a good trim have significant on fuel consumption and vehicle stability);
9. use electrical devices strictly for the time necessary (they absorb a large quantity of energy and, therefore, generate higher fuel consumption);
10. don't use air-conditioning when the external temperature allows it.

References: http://www.governo.it/GovernoInforma/Dossier/Emissioni_auto_2009/

Legambiente and ATA Switzerland EcoTopTen

Designed to provide effective help to choose a car with environmental content, EcoTopTen Auto analyzes more than 750 models of cars most sold in Italy in 2008, including models with gas (CNG and LPG) and excluding those with higher emissions than 180 grams of CO₂ per kilometer.

Three basic parameters on which our assessment has been carried out: emissions of carbon dioxide, the main greenhouse gas, production of harmful pollutants on health and environmental impacts (criterion that penalizes diesel engines without particulate filter) and noise.

webiste of EcoTopTen 2009 <http://ecotoptenauto.viviconstile.org/section.php>

"Well-to-Wheels analysis" conducted by JRC-ISPRA

JRC – ISPRA has been carrying out a study "Well-to-Wheels analysis of future automotive fuels and powertrains in the EU context" aiming to clarify this issue: how to compare different ways to reduce GHG emissions from passenger cars in the 2010-2020 time frame?

The study estimates the energy balance, GHG balance, costs and availability of all technically feasible and alternative fuels from all sources with a significant potential to replace oil-based fuels. Derived figures include cost of GHG avoidance and cost of fossil road-fuel substitution for each alternative fuel process.

This Well-to-Wheels analysis is a consensual reference study, transparent (all assumptions and input data are specified and accessible) and broadly involves the stakeholders (e.g.: oil, car and bio fuel industries collaborate; there have been several Peer Review meetings; many improvements have been achieved using stakeholder suggestions).

To date, the main results of the study are:

- it's easier to do worse than now, even with advanced technologies;
- to do better than with conventional vehicles, it's necessary that the public and private sectors are able to invest and pay a lot (the study is indeed useful to rank and compare the reachable goals and their costs);
- no single fuel pathway offers a short term route to high volumes of "low carbon" fuel: contributions from a number of technologies/routes will be needed;
- conventional bio fuels save GHG if made on EU set-aside land, but the GHG saving per Euro spent and per hectare occupied is much worse than in other sectors.

The Company Group effort on reducing its fleet emissions

The UK Fleet Award recognises innovation in fleet management practice, where an organisation or individual has used a combination of methods at their disposal, including technology, procurement, alternative fuel use, etc. to lower the carbon footprint of their fleet operation.

The Commercial Group has won the Fleet Award 2009. Indeed, in 2008, Commercial Group reduced audited fleet emissions by 29%. This was achieved by a combination of measures which included development of a dynamic routing system that uses multiple inputs, tracking and human intelligence to plan and assess van routes. In all, 140,000 miles were removed through this system.

The biodiesel system has been upgraded to use a real time blending pump that allows any diesel vehicle to run on the optimum fuel blend. This pump integrates with the fuel management system for better analysis of vehicle efficiency, and can provide a reduction of up to 90% in audited emissions.

Staff who live more than 10 miles from the head office work an average of two days in the office a week. This helped reduce emissions from commuting by 42% between 2007 and 2008. Further promotion of public transport for appointments led to a 276% increase against the 2006 baseline. Staff engagement through the company Green Ambassadors Programme, which supports employees reduce their own emissions, includes a strong transport element where mileage reductions and public transport use are incentivised.



The company reports an annual carbon footprint audited by the Edinburgh Centre for Carbon Management (ECCM) to Business in the Community (BITC) as part of the Prince of Wales May Day Network.

In 2009 Commercial rolled out its first Smart ED, which is being used by founding director Simone Mann. Powered by 100% renewable electricity, this car is projected to remove 1.4 tonnes of carbon dioxide a year. As well as significantly reducing carbon emissions, Commercial Group's net profit for the 2008 financial year increased by 46%, the greatest growth the company has seen since it was established 18 years ago, and proof that a business can be profitable and environmentally driven.

Data and Indicators

In the period 1990-2007, road transport was responsible for the largest negative change in green house gas emissions in Europe (EU-27): + 200,7 Mt CO₂-equivalent, equal to a 29.7% increase.

Good behaviour on driving and car maintenance can cut consumption and Green House Gas emissions by 10-15%.

Links and references

To download the European Commission Action Plan on Urban Mobility:

http://ec.europa.eu/transport/urban/urban_mobility/action_plan_en.htm

The EU website on transports. Link: <http://www.eea.europa.eu/themes/transport>

To download the EEA Report Greenhouse gas emission trends and projections in Europe:

http://www.eea.europa.eu/publications/eea_report_2009_9

To download the European Commission *White Paper: European transport policy for 2010*:

http://europa.eu/legislation_summaries/environment/tackling_climate_change/l24007_en.htm

To download the EEA Scientific Committee opinion on the environmental impacts of bio fuel use in Europe:

<http://www.eea.europa.eu/highlights/suspend-10-percent-biofuels-target-says-eeas-scientific-advisory-body>

To download the Italian Car's Guide on fuel savings and CO₂ emissions' cutting on cars:

http://www.governo.it/GovernoInforma/Dossier/Emissioni_auto_2009/